

Rags, Bamboo Were Used To Make Earliest Paper

Today paper is man's indispensable servant. He records his actions, his thoughts and his pleasures and his pains on it. It packages his food and serves him every hour of every day.

But it has only been slightly more than a century that man has had paper in the quantities we know them today. It was in 1850 that a German named Frederic Keller studied the pulp making methods of the wasp and with a mechanic named Henry Holter devised a machine for grinding wood into fibers. In 1852, Hugh Burgess, an English inventor was issued patents for pulping by what is now known as the Soda process.

Paper Limited

Man had had paper for hundreds of years before this, but because of manufacturing methods and the raw material used the amount was limited. The Egyptians laboriously split thin strips from the papyrus weed and glued them together.

The Chinese made probably the first true paper from rags and mulberry and bamboo fibre. The "go-between men" of ancient culture, the Arabs introduced paper to the western world.

In 1789 a French workman, named Louis Robert announced he had discovered a machine which would make large sheets of paper. Two London stationers, Henry and Sealy Fourdrinier, took up his invention and developed it. Today's paper machines are fundamentally the same as that developed by the Fourdriniers.

Modern Demand

To supply the ever growing demand for paper and more paper, modern methods and machines have been applied to every phase of papermaking.

Today's raw materials, trees, are cut from sustained yield tree farms and transported to the mills by methods that would astound and please Paul Bunyan. After reaching the mills logs are stored for size and species.

Barking is the first step from log to paper, and today in Camas a jet of water under extreme pressure literally "blows" the bark away. The savings in usable wood fiber by hydraulic barking adds-up to hundreds of acres of trees over a period of time. Older methods of shaving the bark with revolving disc knives or by rubbing it off in revolving drums are gone forever from Camas.

Five Processes

Today there are five processes for producing paper making fibers from wood. One is mechanical and results in groundwood, three are chemical cooking processes producing sulphite, kraft or soda pulps, and the fifth is semi-chemical.

Newsprint is 80 to 90 per cent groundwood, and the material is also used in lesser quantities in other papers.

Wood is composed of nearly 50 per cent pure cellulose in the form of its fibers. Chemical pulp consists of cellulose fibres with the rest of the wood material removed by the action of chemicals under pressure

and at high temperature. In Camas both the Kraft and Sulphite processes are used.

Is Combination

Semi-chemical pulps are made by a combination of chemical and mechanical treatments. Chemical treatment separates the fibers.

For all chemical or semi-chemical cooking processes, wood must first be reduced to chips. This is done by chippers, which are machines equipped with heavy, rapidly revolving steel discs, set with three or more radial knives. Logs are forced against the discs and cut into small chips ranging from 5/8 to 7/8 inch in length and about 1/8 inch thick. They are then screened to make sure they are the proper size.

Next comes the "cooking." The chips are loaded into digesters that vary in size. Some of the upright cylinders are as large as 58 feet high and 19 feet in diameter. The pulping "liquor" is pumped in, and live steam turned on. Length of time, heat and pressure vary with the character of pulp desired.

Time Varies

In the kraft process, chips are cooked in somewhat smaller digesters than for sulphite, using different chemicals. Cooking time varies from 1½ to several hours, depending on the size and type of digesters, the wood and the quality of the pulp required.

Owing to the use of expensive sodium salts in the kraft and soda processes, the spent cooking liquors are

concentrated to heavy liquids and burned to recover the chemicals. Heat from burning the organic wastes is used to generate process steam.

Further Treatment

Further treatment known as beating and refining is necessary before pulp can be made into paper. This treatment, of course, varies with the type of paper to be made.

Paper Machine

The actual formation of the sheet of paper takes place on the paper machine. There are two types of machines, the Fourdrinier and the Cylinder type, but since all Camas papers are made on Fourdriniers the description will be limited to this type.

Following the Jordan, the stock is further diluted with water until it flows as a suspension. This is run out into a nearly horizontal wire mesh screen known as the "wire" made in the form of an endless belt and travelling away from the point where the pulp flows onto it. Gravity and suction drain the water from the pulp through the fine holes in the wire, and as a result there is formed a film of interlaced fibers — a very wet sheet of paper.

Through Rollers

A lateral shaking motion is applied to the frame so all the fibers will not lie in one direction. Leaving the wire, the wet sheet of paper flows onto a belt of woolen felt, and runs between rollers to press more water from it. The bottom rolls are usually so designed as to apply suction on the paper through the felt.

From here the paper passes through a long series of rotating steam heated iron cylinders, called dryers. All remaining waters except the small percentage always present in paper is driven out here.

Huge jumbo rolls of paper are taken from the machines, and can then be further processed as required. Paper may need further finishing in polished steel calender rolls to smooth it out with weight and pressure...it may be loft dried, tub sized, or be put through any number of other finishing processes.

From tree to paper, science and modern methods are on the job today to give ever finer paper at less cost and with more and more savings in materials. Papermaking is a centuries old art that has come alive and prospered in this modern age.